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Current Opinion in
Environmental Science & Health

Soil Thematic Strategy: An important contribution to policy support, research, data development and raising the awareness

Panos Panagos and Luca Montanarella

Abstract

There has been the recognition that trans-national binding legal agreements related to soils are very difficult to achieve, given the sensitivities related to national sovereignty in relation to land and soils. However, the Soil Thematic Strategy played an important role to raise the awareness of soil importance, integrate soils in different policy areas (agriculture, climate change, SDGs), develop research findings and finally increase our know how on European Soils. The Soil Thematic Strategy continue to be the main policy instrument dedicated to foster soil protection in the European Union (EU). The EU consider the importance of soils and land degradation taking into account global challenges such as the sustainable production intensification, food security, climate change and escalating population growth. During the last decade both the 7th Framework Programme for Research (FP7) and the HORIZON2020 financed research and innovation projects for advancing soil protection and better understanding of soil management in EU.

Addresses

European Commission, Joint Research Centre, Italy

Corresponding author: Panagos, Panos (panos.panagos@ec.europa.eu)

Current Opinion in Environmental Science & Health 2018, **5**:38–41

This review comes from a themed issue on **Sustainable soil management and land restoration**

Edited by **Paulo Pereira** and **Juan F. Martínez-Murillo**

For a complete overview see the Issue and the Editorial

https://doi.org/10.1016/j.coesh.2018.04.008

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Keywords

Policy, ESDAC, Soil conservation, CAP, Land management.

Introduction and some historical aspects

European environment policy has evolved significantly since the 1970s. The European Commission paid attention in having cleaner air, best-quality water and a better understanding of our dependence on a healthy environment. In late 90's, the European Commission tried to integrate the needs of the environment into the development and implementation of other policies, particularly in five key sectors -agriculture, energy, industry, transport and tourism [1]. European Union citizens recognized that environmental problems go beyond national and regional borders and can only be resolved through concerted action at EU and international level [2].

In response to concerns about the degradation of soils in the European Union, the Commission published in April 2002 a Communication "Towards a Thematic Strategy for Soil Protection" [3]. This was the first occasion on which the Commission has addressed soil protection for its own sake and therefore the Communication is both broad and descriptive in approach as well as charting the way forward. The Thematic Strategy for Soil Protection was adopted by the European Commission in September 2006 and consist of a Communication from the Commission to the other European Institutions, a proposal for a framework Directive (a European law), and an Impact Assessment [4]. The strategy explained why further action is needed to ensure a high level of soil protection and explained what kind of measures must be taken. Taking note that the proposal for a Soil Framework Directive has been pending for eight years without a qualified majority in the Council in its favour, the Commission on 30 April 2014 took the decision to withdraw this proposal. At the end, the Commission concluded that "*remains committed to the objective of the protection of soil and will examine options on how to best achieve this*".

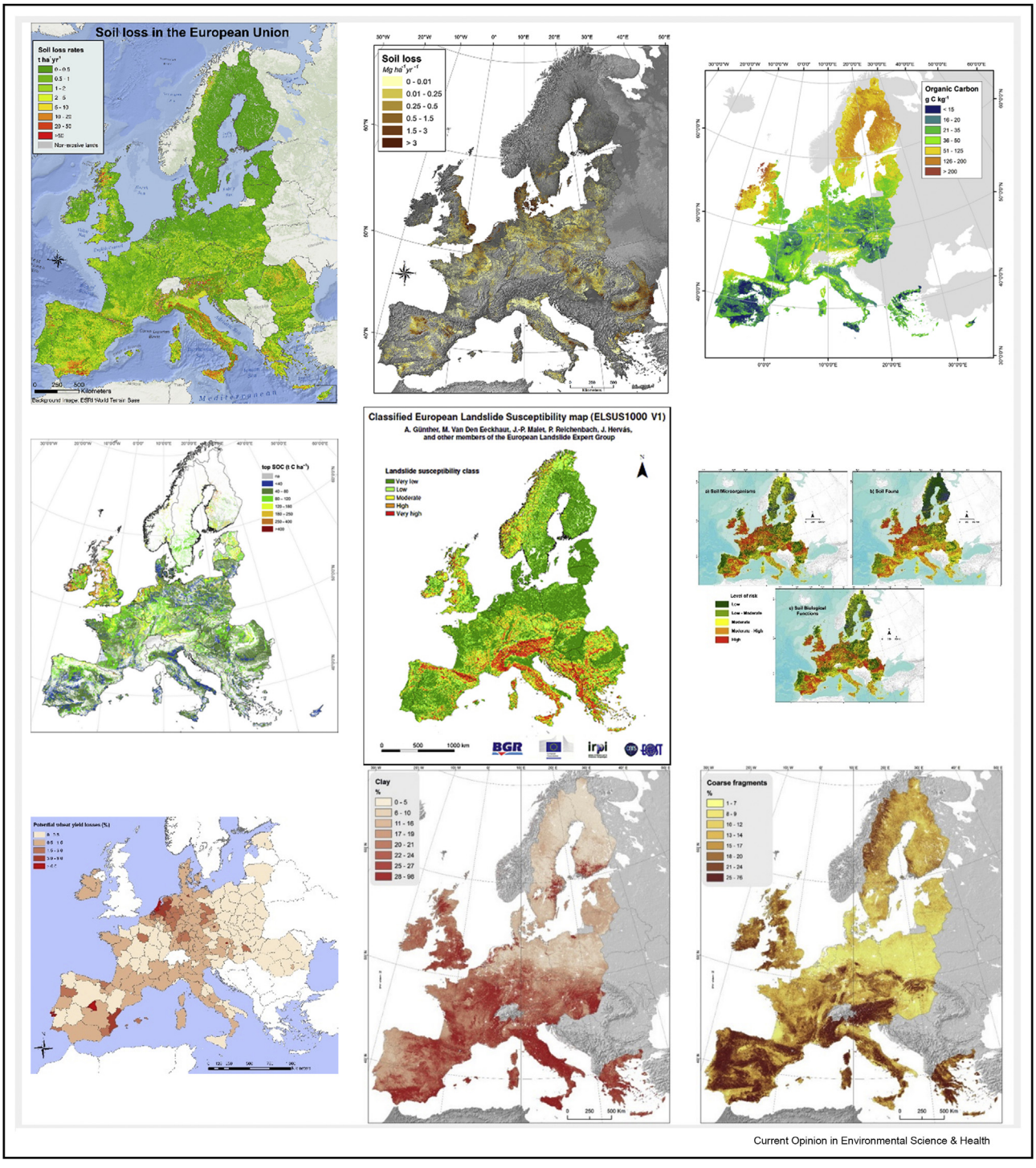
Soil Thematic Strategy as a driver for research, new data & information development

The Soil Thematic Strategy has identified eight main threats to soils: soil erosion, soil organic matter decline, soil compaction, salinization, decline of soil biodiversity, soil sealing, landslides and soil contamination [5]. Glaenser et al. [6] performed a cross-policy analysis to identify gaps and overlaps in existing EU legislation that is related to soil threats and functions. According to their analysis, soil threats such as erosion, decline in organic matter, loss of biodiversity and contamination, were covered in existing legislation, but only a few directives provided targets for reducing the soil threats.

In this context, the European Commission Joint Research Centre (JRC) has established the European Soil Data Centre (ESDAC) as a unique focal point for soil data and information at European Union level [7]. During the last 12 years (since the Soil Thematic Strategy adopted), the ESDAC has developed bio-

physical models for better assessing the soil threats in European Union. Among those developments during the last years, the main output datasets (Figure 1) are: a) the new assessment of soil erosion by water [8] using the RUSLE2015 model b) the wind erosion quantitative assessment [9] using a RWEQ model; c) the predicted organic carbon content in European topsoils [10] using advanced geostatistical modeling; d) the estimation of soil organic carbon stocks using the CENTURY model [11] e) the Landslides susceptibility map [12] f) the

Figure 1



Main datasets developed with biophysical models in European Soil Data Centre (ESDAC): Water erosion, Wind erosion, Soil organic carbon content, Soil organic carbon stocks, Landslides susceptibility, Threats to soil biodiversity, Potential yield losses due to land take, Clay content, Coarse fragments.

main threats to soil biodiversity [13]; g) the soil sealing and impact of land take in food security [14] and h) the physical properties (clay, silt, sand, coarse fragments, bulk density) as examples of advanced soil modeling techniques [15].

Besides the integrated biophysical modelling platform and the information development in ESDAC, the European Commission has performed the Land Use/Cover Areas frame statistical survey on soil properties (LUCAS soil). The 2009 and 2015 LUCAS topsoil survey contribute to the development of open access datasets on physical and chemical properties [16]. LUCAS topsoil will be expanded with biodiversity properties, organic pollutants, bulk density and field observations on soil erosion and peatlands.

Integration with agriculture and climate policies taking plus the global challenges

Among the pilars of the Soil Thematic Strategy is the integration of soil into other policy areas. During the current implementation of the Common Agricultral Policy (CAP) 2014–2020, the soil erosion and soil organic carbon are monitored regularly among other agro-environmental indicators. The European Commission has implemented the Good Agricultural Environmental Conditions (GAEC) with an soil related objective to reduce erosion in agricultural areas suffering with severe erosion (>11 t/ha) annually [17] and mitigate soil organic carbon by applying the best management practices. The EU policies in agricultural sector place high emphasis on soil organic carbon both as indicator of soil quality and as mean to offset CO2 emission through carbon sequestration [11]. Recent research initiatives such as the '4 per mille" are expected to increase global soil organic matter stocks by 4 per 1000 (or 0.4%) per year as a compensation for the global emissions of greenhouse gases by anthropogenic sources [18].

At global level, UN Sustainable Development Goals (SDGs) explicitly identify soil resources as of crucial importance for sustainable development. Goal 2 (Food Security), Goal 3 (Human Health) and Goal 15 (Terrestrial Environment) make explicit reference to the need to preserve soil resources in order to achieve such ambitious goals by 2030. The United Nations Convention to Combat Desertification (UNCCD) has also set the objective for zero land degradation by 2030. In March 2018, the 6th IPBES concluded that combating land degradation and restoring degraded land is an urgent priority to protect the biodiversity and ecosystem services vital to all life on Earth and to ensure human well-being. Soil science needs as well to adapt and evolve into a more holistic and comprehensive discipline addressing soils in the context of sustainable development [19]. A recent study at global scale identified the conversion of forest to croplands and sparse vegetated areas as a main driver for increased erosion [20]. The revised World Soil Charter of Food Agriculture Organization (FAO) and the related Voluntary Guidelines for Sustainable Soil Management [21] can effectively help National governments in implementing positive actions towards soil protection and land restoration.

The main strength of the Soil Thematic Strategy is the call for stronger integrated policy and additional research related to enhanced soil protection in EU. The most important weakness is the non-binding nature of the proposed measures to reduce the negative impact of soil threats and enhance soil functions. The challenge emerges in reinforcing soil protection in the implementation of current legislation on agriculture, climate change, water, biodiversity and waste management. Frelih-Larsen et al. [22] concluded that national policies on soil protection in EU countries are highly variable with a small portion adopting binding measures and cover partially certain soil threats. Moreover, soil related measures are rarely integrated to other related environmental national policies. Finally, there is still a lack of a main policy instrument as an EU legislative driver to establish an integration towards soil protection. The way forward is the implementation of a strategic document addressing the main questions that remained following the withdrawal of the proposed Soil Framework Directive.

Conflict of interest

Nothing declared.

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